

I CLAIM AS MY INVENTION:

1. A system for dispensing viscous fluids in small quantities comprising a recipricatable piston coupled to a variable actuator, a programmable controller operatively connected to the actuator, a position sensor sensing the position of the piston and outputting a signal to the controller reflecting the substantially instantaneous position of the piston, the controller including a computer for comparing piston position signals to pre-determined criteria and outputting control signals to the variable actuator in dependent response thereto.

2. A minute quantity viscous material dispenser comprising a recipricatable pumping piston aligned with a hollow dispensing tip, the piston having an end passing through a pre-dispense chamber containing a pressurized viscous material, a variable drive operably connected to the piston effect to drive the piston in opposite directions towards and away from the tip, a computer control controlling the drive, the computer control effective to control piston movement direction, piston movement pause, piston movement velocity and piston movement distance per pumping stroke.

3. The dispenser of Claim 2 wherein the drive is a linear actuator.

4. The dispenser of Claim 3 wherein the linear actuator is electromagnetically driven.

5. The dispenser of Claim 2 wherein the computer control is effective to additionally control piston movement force.

6. The dispenser of Claim 2 including a piston position sensor effective to output a signal indicative to the instantaneous position of the piston for at least a portion of the stroke travel of the piston.

7. The dispenser of Claim 6 wherein the piston is operatively coupled to a

member which moves in dependent response to movement of the piston and wherein the sensor senses movement of the member.

8. The dispenser according to Claim 7 wherein the sensor includes a light source and a light receiving sensor and wherein the member partially includes light from the source to the sensor, the degree of inclusion being dependent upon the position of the piston.

9. A dispenser according to Claim 2 wherein the piston is coupled to the drive through a quick disconnect connection.

10. The dispenser of Claim 9 wherein the quick disconnect connector is a magnetic coupling.

11. The dispenser of Claim 10 wherein the actuator is moveable to a disconnect position under control of the computer at which the connection is disconnected and to a connect position under control of the computer at which the connection is automatically connected.

12. A computer controlled small quantity reciprocating piston dispense device comprising; a reciprocating piston having a dispense stroke, a dispense tip, a source of material to be dispensed, a variable linear actuator operatively coupled to the piston effective to drive the piston in at least one direction during a dispense stroke to force material toward the tip, a position sensor operably sensing the position of the piston effective to output a first signal reflective of the instantaneous position of the piston, a computer assembly receiving the first signal and effective to output second signals controlling the actuator, at least one of the second signals effective to control the distance of travel of the piston during a dispense stroke.

13. The device of Claim 12 wherein at least one of the second signals is effective to limit movement of the piston away from the dispense tip thereby providing a selective start

position for the next dispense stroke.

14. The device of Claim 13 wherein at least a second of the second signals is effective to initiate dispense stroke and movement of the piston.

15. The device of Claim 14 wherein at least a third of the second signals is effective to control speed of the piston during a dispense stroke.

16. The device of Claim 15 wherein at least a third of the second signals is effective to control force of a dispense stroke.

17. The device of Claim 16 wherein at least a fifth of the second signals is effective to control acceleration of the piston.

18. The device of Claim 17 wherein the actuator is electromagnetically controlled linear actuator.

19. A small quantity viscous fluid dispense assembly comprising a reciprocal piston aligned with a dispense orifice effective to force material through said orifice during a dispense stroke of the piston, a variable linear actuator operatively connected to the piston for driving the piston, a position sensor effective to sense the instantaneous position of the piston, a computer control controlling activation of the variable linear actuator, the computer control effective to vary dispense stroke movement distance electronically.

20. A system for dispensing viscous fluids in small quantities comprising a reciprocal piston coupled to a variable linear actuator, a programmable controller operatively connected to the actuator, a piston sensor sensing the position of the piston and outputting a signal to the controller reflective of the position of the piston, the controller including a computer for comparing piston position signals to stored information and outputting control signals to the variable actuator in dependent response thereto for controlling movement of the piston, a dispense tip for dispensing fluids in dependent response to a dispense stroke of

the piston, a scanner positioned to detect fluid deposited on a work piece from the dispense tip, the scanner outputting signals to the controller representative of a condition of the dispensed fluid on the work piece, the controller effective to compare the dispensed fluid condition signals to stored information and to output control signals to the variable actuator in dependent response thereto for modifying a succeeding dispense stroke parameter.

21. The system in Claim 20 wherein the modified parameter is dispense stroke distance.

22. The systems of Claim 20 wherein the modified dispense stroke parameter is piston speed.

23. The system of Claim 20 wherein the modified dispense stroke parameter is piston force.

24. The system of Claim 20 wherein the modified parameter is at least one of piston stroke distance, piston movement speed, piston acceleration and piston force.

25. The system of Claim 1 wherein the control signals are effective to modify subsequent movement of the piston in at least one of piston stroke distance, piston stroke speed, piston stroke acceleration and piston stroke force.

26. A minute quantity viscous material dispenser comprising a dispense subassembly having at least one hollow dispense tip projecting therefrom, a dispense chamber open to the dispense tip, a predispense chamber open to the dispense chamber, a pressurized supply of fluid in communication with the predispense chamber, a reciprocal piston having an end face movable between positions in the predispense chamber and the dispense chamber, an actuator subassembly including an electronically controlled variable linear actuator operatively coupled to the piston effective to reciprocate the piston, a sensor sensing piston position, a controller receiving signals from the sensor in dependent response to the position

of the piston and outputting control signals to the actuator for controlling movement of the piston, the output signals from the controller effective to variably determine piston stroke, piston movement speed, and piston movement actuation whereby the quantity and speed of material dispensed from the dispense chamber through the dispense tip may be varied per piston stroke and over time.